WHAT IS CLAIMED IS:

1. A process for the oxidation of an olefin comprising three or more carbon atoms, wherein the process comprises:

reacting the olefin with oxygen to form a reaction mixture in the presence of a catalyst composition comprising:

silver; and,

a promoter comprising potassium and a promoter comprising rhenium

deposited on an α-alumina carrier, wherein the potassium promoter provides potassium at a concentration of up to 120 μmole per gram of catalyst composition.

2. The process of claim 1, wherein the potassium promoter provides potassium at a concentration of from 12 μmole to 100 μmole per gram of catalyst composition and the rhenium promoter provides rhenium at a concentration of from 3 μmole to 20 μmole per gram of catalyst composition.

3. The process of claim 2, wherein the α-alumina carrier has a BET surface area of 0.1 m^2/g to 25 m^2/g, and an apparent porosity of from 0.1 ml/g to 1.2 ml/g.

4. The process of claim 1, wherein the α-alumina carrier comprises at least 60 %w α-alumina.

5. The process of claim 1, wherein the α-alumina carrier has a pore size distribution such that the pores with diameters in the range of from 0.2 μm to 10 μm comprise more than 75 % of the total pore volume; the pores with diameters greater than 10 μm comprise less than 20 % of the total pore volume; and the pores with diameters less than 0.2 μm comprise less than 10 % of the total pore volume.

6. The process of claim 1, wherein the α-alumina carrier has a water absorption of at least 0.35 ml/g and a surface area in the range of from 1.0 m^2/g to 5 m^2/g.

7. The process of claim 1, wherein the α-alumina carrier is based on:

(a) from 50 %w to 90 %w of a first particulate α-alumina having an average particle size of from more than 10 μm up to 100 μm; and,

(b) from 10 %w to 50 %w of a second particulate α-alumina having an average particle size of from 1 μm to 10 μm; said %w being based on the total weight of α-alumina in the mixture.

8. The process of claim 1, wherein the α-alumina carrier comprises:

(a) from 65 %w to 75 %w, relative to the total weight of α-alumina in the mixture, of a first particulate α-alumina having an average particle size of from 11 μm to 60 μm;

(b) from 25 %w to 35 %w, relative to the total weight of α-alumina in the mixture, of a second particulate α-alumina having an average particle size of from 2 μm to 6 μm;

(c) from 2 %w to 5 %w of an alumina hydrate, calculated as aluminum oxide relative to the total weight of α-alumina in the mixture;

(d) from 0.2 %w to 0.8 %w of an amorphous silica compound, calculated as silicium oxide relative to the total weight of α-alumina in the mixture; and,

(e) from 0.05%w to 0.3 %w of an alkali metal compound, calculated as the alkali metal oxide relative to the total weight of α-alumina in the mixture.

9. The process of claim 1 wherein the reaction mixture further comprises an organic chloride promoter.

10. The process of claim 9 wherein the organic chloride is present at a concentration of at least 50 ppm by volume.

11. The process of claim 9, wherein the reaction mixture further comprises a NO_x promoter, wherein x is 1 or 2.

12. The process of claim 9, wherein the NO_x promoter is present at a concentration of at least 10 ppm by volume.

13. A catalyst composition for the oxidation of an olefin comprising three or more carbon atoms, wherein the catalyst composition comprises:

silver; and,

a promoter comprising potassium and a promoter comprising rhenium

deposited on an α-alumina carrier, wherein the potassium promoter provides potassium at a concentration of from 8 μmole to 120 μmole per gram of catalyst composition.

14. The catalyst of claim 13, wherein the rhenium promoter provides rhenium at a concentration of from 1 μmole to 30 μmole per gram of catalyst composition.

15. The catalyst of claim 13, wherein the carrier comprises an α-alumina carrier is based on:

(a) from 50 %w to 90 %w of a first particulate α-alumina having an average particle size of from more than 10 up to 100 μm; and,

(b) from about 10 %w to about 50 %w of a second particulate α-alumina having an average particle size of from 1 μm to 10 μm; and wherein said %w is based on the total weight of α-alumina in the mixture.

16. The catalyst of claim 13, wherein α-alumina carrier has a pore size distribution such that pores with diameters in the range of from 0.2 μm to 10 μm represent more than 75 % of the total pore volume; pores with diameters greater than 10 μm represent less than 20 % of the total pore volume; and pores with diameters less than 0.2 μm represent less than 10 % of the total pore volume.

17. The catalyst composition of claim 13, wherein the α-alumina carrier has a water absorption of at least 0.35 ml/g and a surface area in the range of from 0.6m^2/g to 5 m^2/g.

18. The catalyst of claim 13, wherein the carrier comprises an α-alumina carrier having a composition comprising:

(a) from 65 %w to 75 %w, relative to the total weight of α-alumina in the mixture, of a first particulate α-alumina having an average particle size of from 11 μm to 60 μm;

(b) from 25 %w to 35 %w, relative to the total weight of α-alumina in the mixture, of a second particulate α-alumina having an average particle size of from 2 μm to 6 μm;

(c) from 2 %w to 5 %w of an alumina hydrate, calculated as aluminum oxide relative to the total weight of α-alumina in the mixture;

(d) from 0.2 %w to 0.8 %w of an amorphous silica compound, calculated as silicium oxide relative to the total weight of α-alumina in the mixture; and

(e) from 0.05 to 0.3 %w of an alkali metal compound, calculated as the alkali metal oxide relative to the total weight of α-alumina in the mixture.